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MATIC No: 19EN4051015

Q11

Q) Give the IUPAC names of the following compounds.

Answers

a)  $\text{HCOOH} \longrightarrow$  Methanoic acid.

b)  $\text{HOOC}[\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}] \longrightarrow$  Pentan-1,5-dioic acid.

c)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow$  Butanoic acid.

d)  $\text{HO}_2\text{C}-\text{CO}_2\text{H} \longrightarrow$  Ethanedioic acid.

e)  $\text{CH}_3(\text{CH}_2)_4\text{COOH} \longrightarrow$  Hexanoic acid.

f)  $\text{CH}_3\text{CH}=\text{CH}(\text{CH}_2)_2\text{COOH} \longrightarrow$  Hex-4-enoic acid.

Q) Discuss briefly the physical properties of carboxylic acids under the following: Physical appearance, Boiling point & solubility.

Ans

a) Physical appearance: All simple aliphatic carboxylic acids up to  $\text{C}_{10}$  are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

b) Boiling point: This increases with increasing relative molecular mass. Aromatic acid carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.



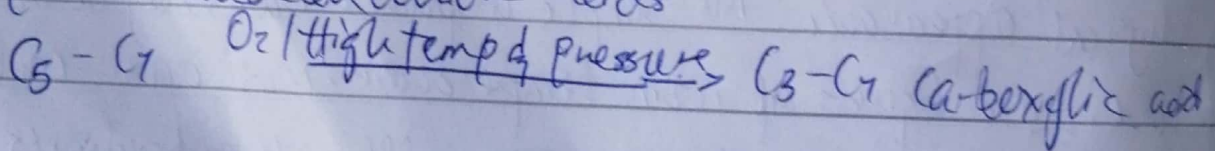
Solubility: low molecular mass (a-butylic acid with up to four carbon atom in their molecules are soluble in water: this largely due to form hydrogen bond with water molecules.

The water-solubility of the acids decreases as the relative molecular mass increases.

### 2) Preparation of carboxylic acids

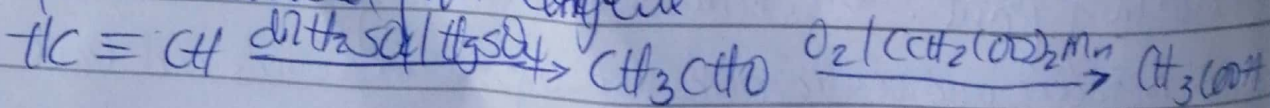
Routes:

a) From petroleum & liquid phase oxidation of C<sub>5</sub>-C<sub>7</sub> alkanes, obtainable from petroleum of high temperature and pressure will give C<sub>5</sub>-C<sub>7</sub> carboxylic acids with methane, propane and butanoic acids.



b) From ethanol: Ethanoic acid is obtained commercially by the liquid phase oxidation of 5% solution of ethanoic acid using manganate (ii) ethanoate catalyst Ethanol

if soft is obtained from ethylene

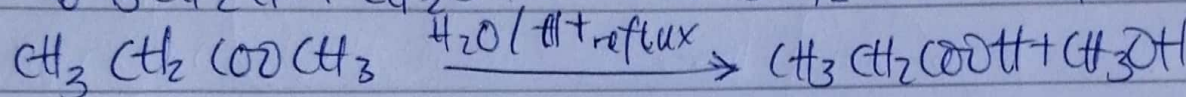
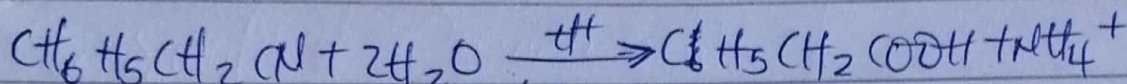
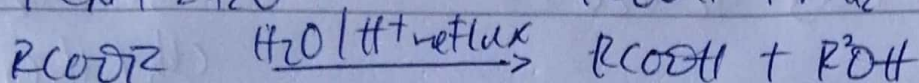
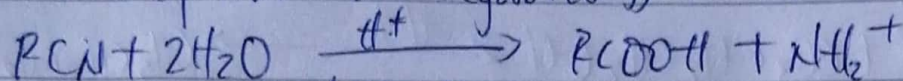




4) Write equation and brief explanation, discuss the synthetic preparation of carboxylic acid.

Answer

Hydrolysis of nitriles (cyanides) or esters

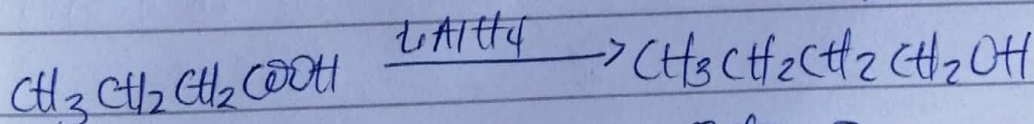
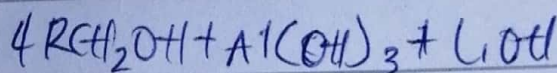
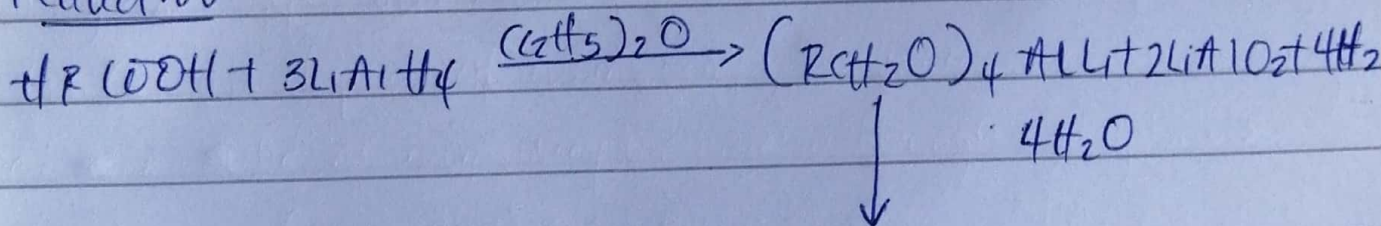


}  
R = alkyl  
or  
aryl  
radical

5) Write chemical equations only. Outline the reduction, decarboxylation and esterification of carboxylic acid.

Ans

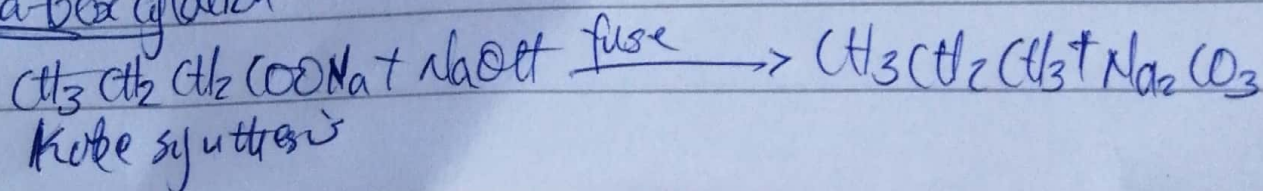
a) Reduction



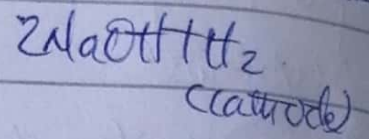
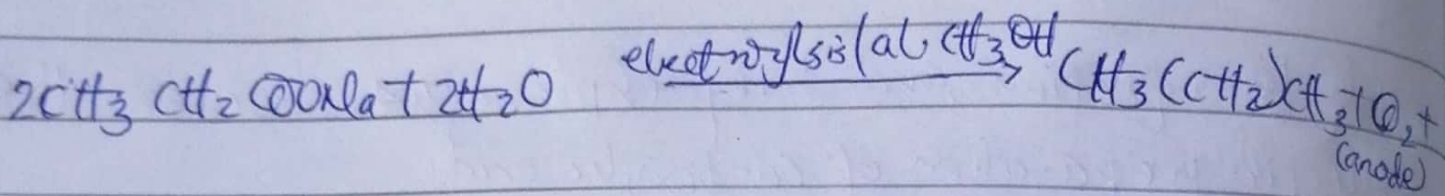
Butanoic acid.

Butanol

b) Decarboxylation



Koch synthesis



Esterification

